Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

changes, such as may conceivably take place in shed and coagulated blood.

I come now to a newer application of the method of vividiffusion, one to which I alluded a few moments ago, namely its possible employment to abstract from the circulating blood certain hormones or products of internal secretion in amounts that will suffice for pharmacological study, if not for chemical analysis. This application is still in its very beginning, many difficulties yet remain to be surmounted, and I speak of it here only because it leads me quite naturally to a field of study which is of the greatest importance, a field which at present is ripe for the methods of the chemical explorer. I refer to the exploration of the organs of internal secretion, especially to the study by chemical methods of their specific products. In attempting this, a vividiffusion apparatus of the proper sort is attached to the veins of a particular organ, as the thyroid gland, and the diffusate thus obtained is studied by pharmacological and chemical methods. This diffusate must also be compared in respect to its pharmacological properties, at least, with both the arterial and the venous blood of the gland under investigation. But whatever may be the outcome of such studies, I hope to make it evident to you in what I am about to say that we are here dealing with matters of the greatest importance to biology and medicine.

JOHN J. ABEL
THE JOHNS HOPKINS MEDICAL SCHOOL

(To be continued)

THE RECENT ACTIVITY OF KILAUEA AND MAUNA LOA, HAWAII

THE volcanoes of Kilauea and Mauna Loa were both active during the past winter, furnishing the rather unusual spectacle of lava lakes within 22 miles of each other, but at a difference in altitude of practically 10,000 feet. The activity of Mauna Loa, as observed from Kilauea, lasted forty-eight days, from November 25, 1914, until January 11, 1915. At Kilauea, the first permanent open pool of magma was formed on October 3, 1914, and this pool increased in size and rose until a maximum height of 363 feet below the rim of the crater Halemaumau was reached on January 4, 1915. Since that time the lake has been slowly subsiding, with temporary rises and pauses. The activity of both volcanoes will be treated in some detail.[1]

The lava lake in Halemaumau, the crater of Kilauea, was visible from the autumn of 1907, which was six months after the cessation of activity on Mauna Loa, until the last of April, 1913. The maximum height reached during this long interval was 60 feet below the rim of the crater on January 1, 1912. During the autumn of 1912 the level of the lake was low, followed by a rise from November, 1912, until January, 1913. During January the lake sank; in February it was at about the same level as in the beginning of March, 1915; in March it sank almost out of sight after a brief rise on March 10; in April the lake was very low and very small, and finally went out.

During the summer of 1913, Halemaumau was an immense flat funnel of slide rock with the base at a depth of over 600 feet. The bottom of the pit was seldom seen on account of the dense fumes. Just before the time of the summer solstice, which reached a culmination on June 22, blowing noises were heard and a faint glow seen in the pit, indicating a slight rise of the lava. In the middle of July, the blowing noises recommenced and visible fire returned on July 23. An inner ring of fuming cones and a glowing chimney near the site of Old Faithful were seen. Once more the signs of activity ceased: the blowing noises did not recommence until the first of September, and a glowing cone near Old Faithful became visible September 24. The glow and the noises

[1] Weekly bulletins concerning the activity of the volcanoes, written by Professor T. A. Jaggar, Jr., and Mr. H. O. Wood, of the Hawaiian Volcano Observatory, are published by the Volcano Research Association. From these bulletins the data for the present paper, previous to the arrival of the writer at the volcano, are obtained. To Mr. H. O. Wood, and to Mr. Arthur Hannon, the writer is indebted for criticism.

continued through October very much as in October, 1912. In November there was a rise, accompanied by flows of lava from the glowing cones, so that in December there was a floor of black lava 200 feet long and 150 feet wide, at a depth of about 580 feet.

From the last of November, 1913, until March, 1914, conditions remained very much the same, with no more flows, but with a glow most of the time. Molten lava was ejected from the Old Faithful orifice to a height of 40 feet on March 6, and there was a short flow the next week. The next flows reported came in the early part of May, with a pool 25 feet in diameter at Old Faithful. This period of activity continued until the middle of June, when the floor had attained a depth of 530 feet. After the summer solstice, until July 26, there was a slower rise, with fewer flows than in May–June. From July 27 until August 5 a subsidence caused a collapse in the floor. An increase in activity caused a long flow on August 28, but there was no permanent increase until October 2, with a collapse of the Old Faithful cone the next day, forming an open pool 40 feet in diameter. On October 4, the pool had become triangular in shape, 100 feet long and 70 feet wide. The next day the pool was 200 feet long and 100 feet wide, with a depth below the rim of about 470 feet. By October 13 the pool had become 600 feet long, but was 28 feet lower. The subsidence continued, with the caving of the walls, until the twenty-second. On October 21, the lava was 518 feet below the rim, and on the twenty-third the lake was 375 feet long, 150 feet wide. From this date until November 6, the lake rose, and a flow 450 feet long came from a cone on the western corner of the floor. On November 16 the line of northeast cones and three northwest cones were engulfed in the lava, forming a northeast arm on the main lake and a separate northwest pond. The length of the lake was estimated, on the 17th, to be 400 feet, the east arm 150 feet long, the northwest pond 100 feet long, and a new northeast pond 12 feet long. The depth of the lake was about 469 feet. Three flows had developed along the floor; one from an east-border pot southward, one from the end of the new east arm northward, one from the north side of the northwest pond northward. The length of these flows was about 100 feet each.

The week preceding the outbreak of Mauna Loa witnessed a slightly less active condition in the Halemaumau lake than during the previous week. On November 19 the lake was 460 feet below the rim, with the current running from the west into the east arm. The east arm and the northwest pond were enlarged by collapse of the sides. Until December 1, the lake remained from 5 to 30 feet below the level of the floor, with daily fluctuations of level, reaching a maximum height about noon. Streaming, traveling fountains, and caves against which the lava splashed with surf noises were of common occurrence.

On December 2, two fresh flows were observed on the floor; one had come from the west end of the pit and spread along the west and north margins, the other from near the east cove and spread northward. The north boiling pot had enlarged almost to a small pool. On December 4, there was a small flow on the north side of the pit, glowing and hissing cones on the west floor and in the southwest talus, and a small splashing at the southeast cone. There was a collapse of the floor on the north side of the pit, leaving what later developed into a rising crag between the main lake and the northern floor. On the fifth and sixth spurts and flows of lava came out of the west cones and a cone 50 feet up on the southwest talus. The flow from the west cones on the sixth covered the whole southwest border of the floor, 500 feet in length. In the main lake, a torrent was pouring from the east arm into the main pool. On December 7 a further collapse of the floor area on the north produced a trench between the east arm and the northwest pond, the floor block between this trench and the lake being raised and tilted toward the lake to produce what will be called the "crag." A slight drop in the level of the lake the next day showed a promontory between the crag and the east arm, almost cutting off the latter. By December 9, the crag had risen on the north side 58 feet above the

lake level, which was 446 feet. The length of the lake was 435 feet, the floor 750 feet.

Until the thirteenth, little change took place in the lake. The fountaining was active, especially at Old Faithful, the streaming normally active with sudden reversals of direction, and splashing caves. On the twelfth and thirteenth, new flows spread south and north from the west cones, and the old floor had tilted downward on the west, indicating that the floor which fills the Halemaumau pit is subject to differential tilting movements from loading or unloading, irrespective of the relative stability of the walls of the pit. For the first time in 1914, the main lake overflowed, the flows moving southward.

From December 18 to 22, at the time of the winter solstice, a rise took place in the lake. The rise started with tremendous flows pouring from the northwest pond north and south, reaching the main lake on the north at the east arm, on the south at the southwest. With these flows, the crag and the west cones rose like islands. The rate of flow was, at the source, one half to one mile an hour, and the duration of the flow nineteen hours. On the succeeding days there were similar flows, always coming either from the northwest pond or from the cones. In the lake, meantime, the currents from the east met smaller ones from the west in the vicinity of Old Faithful, causing violent fountaining. With the sudden rises there was frequently a diminution in the fountaining, the east arm and northwest pond skimming over.

The flows occasionally ran into caverns or ovens on the southern floor. In the case of one of the ovens, blobs of molten lava were thrown to a height of 50 feet as the torrent poured in. The crag rose with the flooding of the floor and with the rise in the lake, until on December 28 it was 47 feet above the lake.

On the twenty-eighth a flow poured around the north side of the crag and overwhelmed the east arm. Above this arm there was an open lava tube, about 10 feet in diameter, which had been exposed for several months. Into this tube, on the northeast wall of Halemaumau, the flow ran, with a crackling noise, for thirty hours or more, forming a pseudo-intrusive body. The flow was in the form of a cascade, with a ten-mile-an-hour current. Two days later the frozen cascade was covered by another flow. About March 1, 1915, a slide uncovered the filled entrance to the tube.

The closing days of the year were marked by new flows from the main lake as well as from the cones and the northwest pond. Several flows from the latter cascaded directly into the main lake at the west end, when the level of the lake was 10 feet below the rim. New Year's Eve witnessed jets of lava spurting to a height of 100 feet from the top of a cone on the southwest floor. The southeast cove of main lake was divided in two parts by a projecting lump of spatter. The northern portion was a seething cauldron into which lava poured with incessant fountaining, the cauldron maintaining a level two to three feet lower than the main lake. The southern portion of the cove was normally full of lava to the level of the main lake.

The maximum activity was attained during the first few days of January, 1915. On the second the lake had attained a level of 368 feet, and was one foot below the bank. On the following day the northwest pond had increased in size and a west pond had developed. The southeast cove had lost its partition and resumed its normal activity. The fumes on this and the preceding day were less dense than at any other time in the period of activity.

The relative movement of the lake and crag on the north are noteworthy. On December 9 and 23, the crag was 58 feet above the lake although the lake had risen 41 feet. On January 2, the lake had risen 12 feet more, but the crag had subsided 12 feet as it was only 23 feet above the lake.

Indications of slow subsidence were noted after January 4, in the increasing fume cloud, falling lava, enlargement of the ponds, and scarcity of new flows. On the 5th there were new flows on the floor from the south and southeast coves, and a definite pond had formed southwest. This additional pond made the third in a semicircle at the west side of the pit, each being about 100 feet long and oval in

shape. During the day the southwest and west ponds filled up and overflowed, but the main lake remained about 4 feet below its banks. The streaming was from east to west, with fountains bursting to a height of 40 feet at Old Faithful. The level of the lake on January 6 was 368 feet, and about 10 feet below its walls. The southwest pond had become an oval pit 20 feet deep with a sunken black crust for a floor. Molten lava poured over one corner of the floor and a fountain played in another. The west pond was crusted over. The northwest pond was active.

With the subsidence on January 7–8, the floor began to crack. The following day the lake was 15 feet below the floor and a large crack had developed near the southwest shore of the lake. In the east pot, a continuation of the southeast cove, the lava was streaming southeast. The southwest pond remained a pit; the west pond had a dim glow; and the northwest pond remained active. On the 11th, there was a small flow southwestward from the west pond. The next day there were evidences of subsidence in the enlarging of the pool, by inbreak on the north end of the east arm; in slides; in blowing noises; greater fountain activity and streaming. The lake was 495 feet long, the east arm 250 feet long from its entrance, the depth 391 feet, with an inner wall 28 feet high.

On January 13 the east pot collapsed. The southwest and west ponds were deep pits, the latter smoking, but the northwest pond remained active. The streaming on the 13th and 14th was from the east toward the west. Rock slides took place on the 15th and 16th. On the 18th the bridge between the southeast cove and the east pot collapsed. There was a torrential inpouring, for a time, at the north end of the east arm. Later there was a sudden rise of 5 feet with a flow toward the west, and a green-blue flame 5 feet high; followed in 15 minutes by a subsidence of 5 feet. The sinking continued on the 19th with intense fountaining, streaming from the east arm, and rock slides. On the 20th, lava cascaded into the lake from an orifice 3 feet above the lake level on the west side. The direction of streaming reversed suddenly several times, with sudden small changes in level of the lake.

Whirlpooling began on January 23, with a whirlpool in the south cove, 100 feet in diameter and a very rapid rotation counter-clockwise accompanied by a roaring noise. Torrents were pouring from the east arm. The northwest pond was active, but the other ponds had ceased activity. The lake was 515 feet long, 160 feet wide, 440 feet below the rim; the east arm was 420 feet long. The crag had become flatter, sinking toward its original position.

After a temporary rise on the 24th, and another on the 27th, the lake was 436 feet below the rim and the crag 376 feet on the 30th. Caving took place on the north edge of the lake, and on the next day at the east end of the southeast cove. The southwest part of the old floor subsided.

Whirlpools were formed February 2–4, but in neither case was the motion so rapid or so violent or was there such a convexity to the stream as on January 23. On each of the three days in February a torrent poured from the east arm or out of the southwest cove, at a rate of 10 to 15 miles an hour, and developed a powerful vortex near Old Faithful with a clockwise rotation. Through the convex stream, bubble fountains burst incessantly. Back eddies were occasionally developed in the south cove and at the west end.

Slow subsidence continued during February, with the formation of concentric benches by subsidence of portions of the 1914 floor, and with active gas escape and fountaining, which indicates a concentrated escape of the gas and active convection. On the 11th, a new 1915 bench was built by a temporary rise. The west pit had become continuous with the northwest, and later it became joined by a trench with the east arm, which froze over by the 18th, and ceased to be a part of the lake. By the latter date, a depression had developed across the south side of the pit. New smoke holes had developed in a number of places, and these, together with fumaroles on the south side, make seeing difficult. The northwest pond had crusted over and temporarily ceased activity.

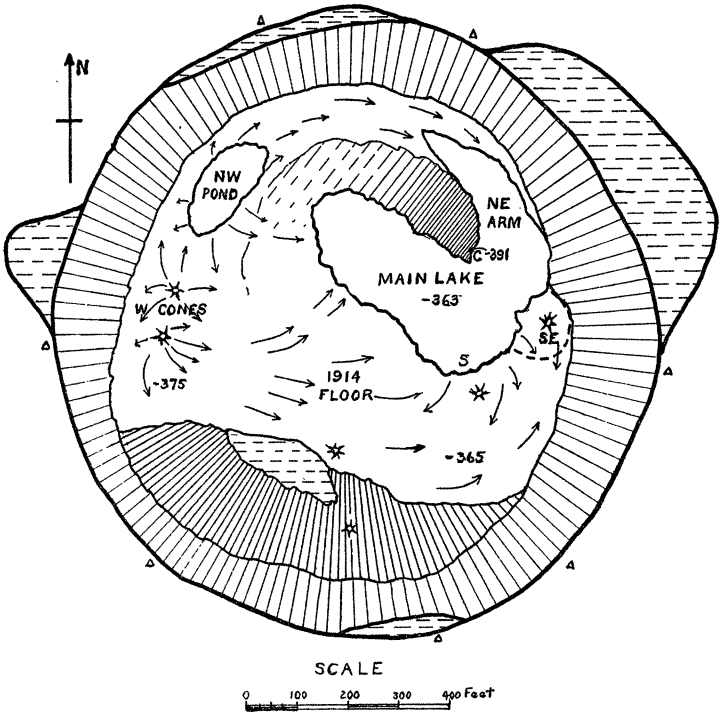

FIG. 1. The lava lake in the pit of the crater Halemaumau, at the time of the maximum activity about January 4, 1915. The main lake and the northwest pond, especially the west cones and pots, were the sources of the lava flows which built up the 1914 floor. The west and southwest cones developed into ponds, and the southeast cone (SE.) into an arm to the main lake like the south arm (S.). Between the northeast (or east) arm and the main lake is the crag which rose and sank with the lake, as a counterbalance to the flooding of the floor as indicated by arrows. South of the floor is a talus slope with a fragment of a ledge at the base. Around the rim of the pit are remnants of the 1911–12 floor and of 1894 cave-ins.

During the last of February, the lava remained at a level of about 460 feet below the rim, with daily variations, and especially rises at noon and midnight, of 2 to 20 feet. Fountains were very active in the Old Faithful region, and the streaming was variable, and often rapid. At the sides of the lake caves would splash, and the lava run in as long as the gas explosions continued. Some of the caves remained active for five minutes or less, others for hours. Migrating fountains were active, and frequently a fountain area near the center of the lake, into which lava was streaming, would suddenly move to one side of the lake and form a splashing cave.

On February 23 and 24, the lake rose to within a foot or two of the 1915 small floor on the south side. The following day the lava flooded the lower floor at noon and at night, with fountains spraying 50 to 80 feet high. The streaming was from the northeast toward the west and less actively toward the southeast. Four new driblet cones appeared in the western trench at the site of the pots and cones from which the flows came at the close of 1914. On the 27th, Old Faithful was playing at intervals of 10–20 and 50–60 seconds. On the 28th, a sudden rise at noon flooded the lower floor.

A small arm to the lake on the southeast developed by March 1, and the following morning a clockwise vortex developed in it, with an inrush at a rate of 8 miles an hour into the east side, the lava pouring out of the

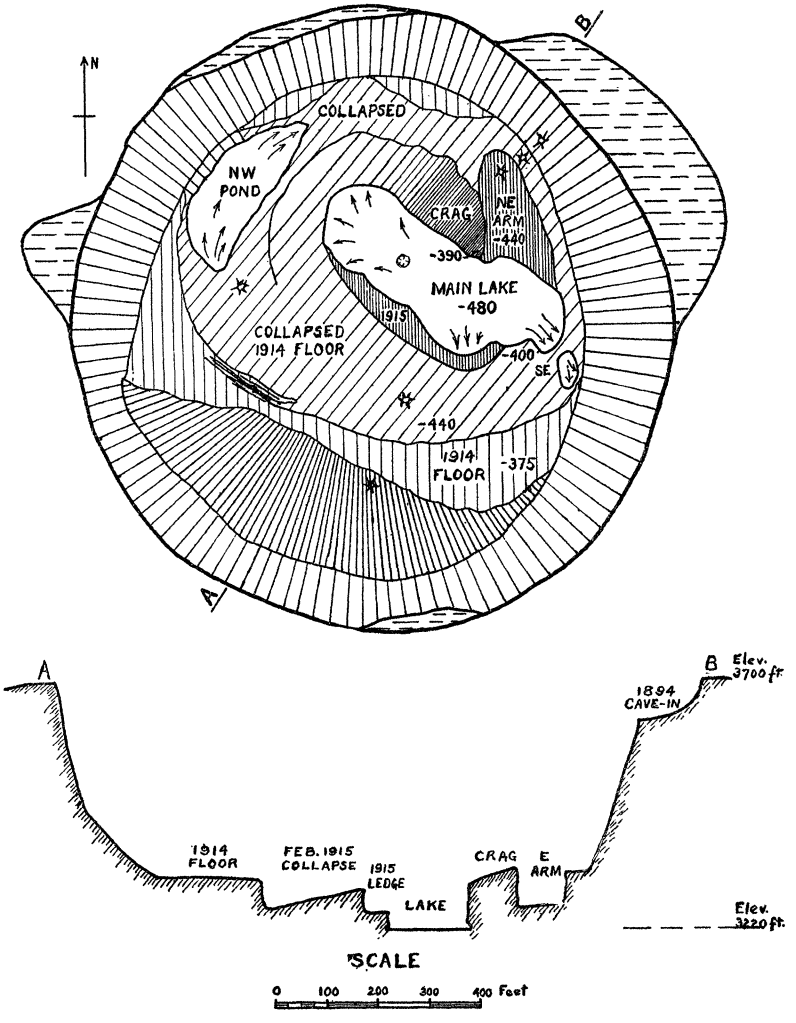

Fig. 2. The pit of Halemaumau on March 15, 1915. In the main lake, the northwest pond, and a small southeast pond (SE.), the general directions of the currents in the lava are shown by arrows. The collapsed 1914 floor is greatly fissured and broken up into blocks which can not be represented here. The cross-section A–B shows the remnants of the 1914 floor. The elevations given are above sea-level; the depths are below the rim.

southeast end and from the main lake. This rush lasted for an hour, and at noon the lake became quiet, indicating a rise. On the 3d, the lava streamed from the middle, both east and west, and a torrent poured into the southeast arm which maintained a level several feet below the lake.

The activity in March in the main lake has been very much as during the last of February. Portions of the lake have been frozen at times, especially the east-central portion, only to break up suddenly, when a fountain developed at the side of the lake, and the crusts streamed toward the fountain. On several days lines of fountains have been observed toward which crusts were drawn, and sometimes the whole line migrated to the margin of the lake to form a spatter-fountain. The most persistent

of the splashing caves have been on the west and south sides, with streaming in these directions.

The northwest pool appeared on March 7, owing to a collapse of a portion of the crust on which there had been spatter cones. The pool was 25 × 40 feet. The next day the pond was larger, and on the 9th still larger. Southeast of the pool there was a small orifice throwing drops of molten lava 70 feet in the air. The lava in this orifice was several feet lower than the level of the pond, although but a few feet away. The pool was fountaining quietly until the crust suddenly broke up and was swept in the north end. On the 15th, this pond had increased in size until it was 270 feet long (north-south), and 100 feet wide. All the fumaroles had collapsed into the pond. The pool was quiet with three splashing caves until suddenly a violent streaming from the south end to the northeast end developed, and three minutes later the 1914 shelf above the place of inflow collapsed. The north end of the pond was filled with talus, and the remainder became quiet.

The main lake on March 15 was found to have increased in size by a collapse, on the south side, of a crescentic area 150 feet long and 30 feet wide in the center. The length of the lake from northwest to southeast was 500 feet, the width at the center 150 feet, the depth 480 feet—35 feet below the 1915 ledge. On the southeast, a small pond had developed by the appearance of a ledge across the southeast arm of the lake. This pond was splashing violently. The next day the lava from the main lake was pouring into it under a natural bridge, and rushing at a rate of 6 miles an hour under the 1914 shelf on the south. On the 19th, this current was still rushing into the small pond, and the level of the lake had dropped. The northwest pond had also dropped, leaving a circular shelf and a black ledge.

Mauna Loa broke out, with great lava fountains in the crater Mokuaweoweo, between noon and one o'clock on November 25, 1914, as described by Professor T. A. Jaggar, Jr.[2] On the 28th, the party which reached the summit observed a long fountaining pool on the south side of the Mokuaweoweo basin, with overflows on the floor. There were eight main fountains and a sheet fountain on the south, playing continuously to heights of 300 to 400 feet. On December 4, only four fountains were seen, the northernmost being the larger.

The fume column on the first night was of the pine-tree form, being composed of from 4 to 6 wavy strands. On the second night the column was estimated by Mr. H. O. Wood to have a height of 6,000 to 7,000 feet. On the first of December, a slender, straight fume column was seen, faintly illuminated, and rising to a height of 9,000 feet or more. From December 7 until the evening of the 10th, no trace of a fume column was seen from Kilauea. An evening glow and fume cloud, and occasionally fumes by day, were visible on clear days during the remainder of December, and until January 11, when both glow and fume cloud disappeared together. The greatest fume column in December was after Christmas, and the final diminution in volume occurred during the last week.

The Volcano Observatory expedition reached the summit on December 15. In the southwest part of the crater a large red fountain was playing continually to a height of 100 feet and occasionally to a height of 150 feet. The fountain was at the northeast corner of a pool of crusted pumiceous lava, and in front of a portion of a cone 75 feet high of its own construction. On the west side of the lake there were lower fountains, and still other fountains broke through the crust of the pool at different times. The character of the fountains, with jets forming fragments which floated away, suggested a very gaseous, light liquid. No changes in the walls or pits of Mokuaweoweo were observed.

The activity of these volcanoes in the immediate future is difficult to predict because of the scarcity of detailed information concerning them previous to 1911. A general response of the lava to earth tides has already been shown by Mr. F. A. Perret, and the summary given above shows that the lava in Kilauea

[2] *Amer. Jour. Sci.*, Vol. 39, 1915, pp. 167–172.

tends to rise at solsticial times, and to sink at the time of the equinoxes. Mauna Loa responded to the last solstice with an outbreak. In Kilauea a daily rise at noon and midnight has been observed at almost all the prolonged watches during the past month. There has also been a periodic activity of Mauna Loa, and a certain amount of periodicity in Kilauea.

At the time of the 1907 activity of Mauna Loa there was a period of relative inactivity in Kilauea. Since that time there has been prolonged activity. If the next quiescence is to come in the near future, as is perhaps foreshadowed by the dropping of the lava in 1913–14, the lava may continue to drop after the coming equinox, and disappear. If, on the other hand, the present period of activity is to continue, the lake will rise during the spring in response to the summer solstice.

Mauna Loa, since the first known eruption in 1832, has shown an average duration of epochs of 11.5 years before 1868, and 5.5 years since 1868; with an average interval of repose before 1868 of 5.5 years, and since 1868 of 4.75 years. The maximum intervals of repose have been eight years each, the second being the last one. Moreover, the general activity has been an outbreak on the summit, followed, sooner or later, by an outbreak on the side of the mountain accompanied by a lava flow. Within the next three or four years, at one of the solsticial times, there should be another flow.

Sidney Powers
Hawaiian Volcano Observatory,
March 19, 1915

INTERSTATE CEREAL CONFERENCE

An Interstate Cereal Conference was held at the University of California, Berkeley, June 2, 1915, with an attendance of 37. Dr. J. W. Gilmore, of the University of California, was elected chairman and Mr. Charles E. Chambliss, of the U. S. Department of Agriculture, secretary. The executive committee consists of the officers and Messrs. M. A. Carleton, F. S. Harris and Bert D. Ingels. The program was as follows:

"Cereal Production in California as Affected by Geographic and Climatologic Conditions," by J. W. Gilmore and B. A. Madson.

"The Water Requirements of Cereals as determined by Physical Environments," by H. L. Shantz and L. J. Briggs.

"Work with Cereals at the Nevada Experiment Station," by C. S. Knight.

"Effect of Various Alkali Salts on the Growth of Cereals," by F. S. Harris.

"Improvement of Barley for the Pacific Coast," by E. Clemens Horst.

"Possible Sources of Barley for Introduction into California," by H. V. Harlan.

"Present Status of Studies of *Helminthosporium* Diseases of Barley in America," by A. G. Johnson.

"*Rhyncosporium graminicola* on Barley," by James McMurphy.

"Cereal Diseases and their Control in Denmark," by F. Kølpin Ravn.

"Wheat Varieties of the Basin and Pacific Coast States," by C. R. Ball.

"The Bunt Problem in the Pacific Coast States," by H. B. Humphrey.

"Wheat Breeding in the Rocky Mountain Regions," by B. C. Buffum.

"The Effect of Rust on Water Requirement of Wheat at Akron, Colo.," by H. L. Shantz and L. J. Briggs.

"The Milling of California Wheat," by B. D. Ingels.

"Commercial Handling and Grading of Grain," by L. M. Jeffers.

On June 1 the cereal crops in the vicinity of Stockton, Cal., were inspected by many in attendance at the conference.

The cereal experiments of the University of California at Davis and of the office of cereal investigations, U. S. Department of Agriculture, at Chico and Biggs, Cal., were inspected June 3 and 4.

Charles E. Chambliss,
Secretary

INVENTION COMMITTEES IN ENGLAND AND IN THE UNITED STATES

The Invention Board established by the British government consists of a central committee and consultants who will advise the main committee on questions referred to them.